

## CLAIMS

We claim:

1. A data link tester comprising:
  - (a) a computer comprising a processor and a memory, wherein the computer is capable of a connection with a communications bus in a piece of equipment and further wherein the piece of equipment comprises at least one component of interest in selective contact with the communications bus; and
  - (b) instructions stored in the memory and executable by the processor for (1) building a roster comprising at least one identifier of the component and (2) then performing a diagnostic step comprising analyzing communications received from the communications bus to determine the condition of communications with respect to the component.
2. The data link tester of claim 1, further comprising a user interface.
3. The data link tester of claim 1, wherein the computer is a component controller.
4. The data link tester of claim 1, wherein the identifier is associated with at least one of a component description, a number of lost communication events, a time not communicating, a number of messages received per second, a number of bad messages, a component make, a component model and a component serial number.
5. The data link tester of claim 1, wherein the diagnostic step further comprises determining whether there has been a lost communications event relating to the identifier.
6. The data link tester of claim 1, wherein the diagnostic step further comprises determining a time not communicating relating to the identifier.
7. The data link tester of claim 1, wherein the diagnostic step further comprises determining a number of messages received per second relating to the identifier.
8. The data link tester of claim 1, wherein the diagnostic step further comprises determining a number of bad messages relating to the identifier.

9. The data link tester of claim 1, wherein the diagnostic step further comprises determining that the communications received from the communications bus contain at least one second identifier of at least one second component in the piece of equipment, wherein the second identifier is not in the roster.

10. The data link tester of claim 9, wherein the instructions stored in the memory are further executable by the processor for adding the second identifier to the roster.

11. The data link tester of claim 1, wherein the diagnostic step further comprises extracting from the communications received from the communications bus information related to the identifier.

12. The data link tester of claim 1, wherein the computer communicates with the communications bus according to the SAE J1587 standard.

13. The data link tester of claim 1, wherein the computer communicates with the communications bus according to the SAE J1939 standard.

14. The data link tester of claim 1, wherein the piece of equipment is a vehicle.

15. The data link tester of claim 1, wherein the computer is on board the piece of equipment.

16. The data link tester of claim 1, further comprising a second computer capable of receiving data that the computer causes to be uploaded from the memory.

17. The data link tester of claim 1, wherein the connection comprises a cable that supports the RS-232 data communications standard.

18. A data link tester comprising:
- (a) a computer comprising a processor and a memory, wherein the computer is capable of a connection with a communications bus in a piece of equipment and further wherein the piece of equipment comprises at least one component of interest in selective contact with the communications bus; and
  - (b) instructions stored in the memory and executable by the processor for (1) building a roster comprising at least one identifier of the component and (2) then performing a diagnostic step comprising determining whether a message that contains the identifier has been received from the communications bus within a specified period of time.
19. The data link tester of claim 18, wherein the specified period of time is in a range from approximately 400 milliseconds to approximately 2.5 seconds.
20. The data link tester of claim 18, further comprising a user interface.
21. The data link tester of claim 18, wherein the computer is a component controller.
22. The data link tester of claim 18, wherein the processor communicates with the communications bus according to the SAE J1587 standard.
23. The data link tester of claim 18, wherein the processor communicates with the communications bus according to the SAE J1939 standard.
24. The data link tester of claim 18, further comprising a second computer capable of receiving data that the computer causes to be uploaded from the memory.
25. The data link tester of claim 18, wherein the equipment comprises a vehicle.
26. The data link tester of claim 18, wherein the computer is on board the piece of equipment.
27. The data link tester of claim 18, wherein the connection comprises a cable that supports the RS-232 data communications standard.

28. A data link tester comprising:

- (a) a computer comprising a processor and a memory, wherein the computer is capable of a connection with a communications bus in a piece of equipment and further wherein the piece of equipment comprises at least one component of interest in selective contact with the communications bus; and
- (b) instructions stored in the memory and executable by the processor for diagnosing at least one fault condition in CAN communications in the communications bus by performing at least one CAN message check comprising determining whether a CAN message has been received from the communications bus and then performing at least one diagnostic step.

29. The data link tester of claim 28, wherein the at least one CAN message check is performed a plurality of times and the diagnostic step comprises determining whether a specified time exceeds an elapsed period of time between performance of a first CAN message check in which a CAN message was detected containing data and a second CAN message check in which a CAN message was detected not containing data.

30. The data link tester of claim 29, wherein the diagnostic step comprises determining whether a link open condition exists.

31. The data link tester of claim 28, wherein the at least one CAN message check is performed a plurality of times and the diagnostic step comprises determining whether a specified period of time exceeds an elapsed period of time between performance of a first CAN message check in which a CAN message was detected containing data and a second CAN message check in which a CAN message was detected containing data.

32. The data link tester of claim 31, wherein the diagnostic step comprises determining whether a link shorted condition exists by determining whether the communications bus has been sending only ones for the specified period of time.

33. The data link tester of claim 31, wherein the diagnostic step comprises determining whether a link shorted condition exists by determining whether the communications bus has been sending only zeros for the specified period of time.

34. The data link tester of claim 28, wherein, if it has been determined in the CAN message check that a CAN message has not been received from the communications bus, the diagnostic step comprises determining whether a CAN error has been received.

35. The data link tester of claim 34, wherein the CAN error is selected from the group consisting of a stuffing error, a form error, and a cyclic redundancy check (CRC) error.

36. The data link tester of claim 28, wherein the equipment comprises a vehicle.

37. The data link tester of claim 28, wherein the computer is on board the piece of equipment.

38. The data link tester of claim 28, further comprising a user interface.

39. The data link tester of claim 28, wherein the computer is a component controller.

40. The data link tester of claim 28, wherein the connection comprises a cable that supports the RS-232 data communications standard.

41. A data link tester comprising:

(a) a computer comprising a processor and a memory, wherein the computer is capable of a connection with a communications bus in a piece of equipment and further wherein the piece of equipment comprises at least one component of interest in selective contact with the communications bus; and

(b) instructions stored in the memory and executable by the processor for (1) building a roster comprising at least one identifier of the component and (2) then performing a diagnostic step comprising at least one of (i) analyzing communications received from the communications bus to determine the condition of communications with respect to the component, (ii) determining whether a message that contains the identifier has been received from the communications bus within a specified period of time, and (iii) diagnosing at least one fault condition in CAN communications in the communications bus by performing at least

one CAN message check comprising determining whether a CAN message has been received from the communications bus and then performing at least one second diagnostic step.